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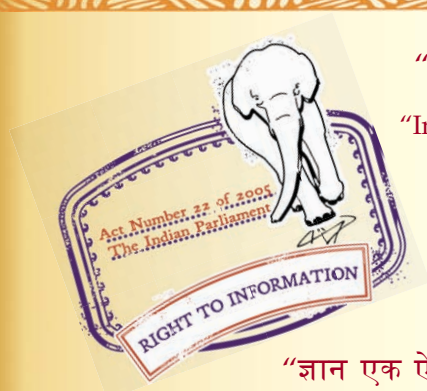
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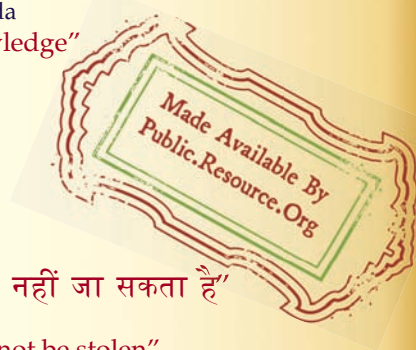
IS 12386 (1988): disperse yellow 3 for textile industry
[TXD 7: Textile Sizing and Finishing Materials]



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Bhartrhari—Nitiśatakam

“Knowledge is such a treasure which cannot be stolen”

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IS: 12386-1988

(Reaffirmed 2000)

Indian Standard

**SPECIFICATION FOR
DISPERSE YELLOW 3 FOR TEXTILE INDUSTRY**

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BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

Indian Standard

SPECIFICATION FOR DISPERSE YELLOW 3 FOR TEXTILE INDUSTRY

0. FOREWORD

0.1 This Indian Standard was adopted by the Bureau of Indian Standards on 29 April 1988, after the draft finalized by the **Dyestuffs** Sectional Committee had been approved by the Textile Division Council.

0.2 Disperse dyes are extensively used for dyeing and printing of hydrophobic fibres, such as polyester, cellulose acetate, nylon and their blends with other fibres. These have become especially important for polyester fibres as they are widely used as a component of blends with cotton, wool or any other man-made fibres.

0.3 The quality of dyeing and printing with disperse dyes depends upon the characteristics of the dyestuff; nature of dispersing agent, nature of carrier used for dyeing and the method and conditions of process employed for dyeing or printing. In order to achieve optimum quality with minimum lot to lot variations and variations in dyeing due to same dyes of different manufacturers, it is essential to standardize these dyestuffs. This will also lead to minimize cost benefit ratio and help the user to adjust his dyeing or printing recipes suitably.

0.4 Disperse yellow 3 (Colour Index No. 11855) is used for producing yellow shades on acetate fibres with good all round fastness properties.

It is also very suitable for colouring nylon fibres on account of its excellent affinity and fastness properties especially for nylon hosiery goods. It may also be used for colouring polyester and polyvinyl chloride fibres. While colouring unions of acetate or nylon with other fibres, silk and wool are heavily stained by this dye while cotton and viscose remain unstained. This dye is suitable for direct and discharge printing of acetate and nylon.

0.5 Disperse yellow 3 has been termed **carceno-genic** in literature. It should, therefore, be handled with care. It also promotes catalytic fading in combination with di- or **tetra-substituted anthraquinone disperse blues** on acetate and synthetics, and should not be used in mixtures with these dyes.

0.6 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the results of a test or analysis, shall be rounded off in accordance with IS : 2-1960*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

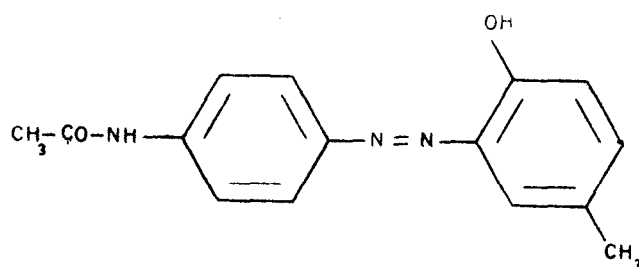
*Rules for rounding off numerical values (*revised*).

1. SCOPE

1.1 This standard prescribes the requirements for disperse yellow 3 used in textile industry.

2. CHEMICAL COMPOSITION

2.1 Disperse yellow 3 shall have the following chemical structure with empirical formula $C_{15}H_{15}O_2N_3$ and the molecular weight of the dye shall be 269.303:



Disperse Yellow 3

2.1.1 It shall be manufactured by **diazotization** of p-amino-acetanilide and coupling with p-cresol.

3. PHYSICAL STATE

3.1 The dye shall be supplied in the form of a powder mixture containing auxiliary substances with value of the dye content as agreed to between the buyer and the seller when tested by the method prescribed in **A-1**. The tolerance on the agreed value of dye content shall be ± 2 percent.

4. IDENTIFICATION

4.1 Solubility — The dye shall be soluble in ethanol, acetone and benzene.

4.2 Action of Sulphuric Acid — On adding concentrated sulphuric acid, the dye shall give orange colour which, on further dilution with distilled water, will convert into golden yellow to yellowish brown colour.

4.3 Action of Sodium Hydroxide — On addition of concentrated sodium hydroxide solution (18 percent *m/m*), the dye shall give orange colour.

5. STANDARD DYESTUFF

5.1 In order to compare the strength and tint of the dyestuff, a standard sample of the dyestuff shall be sealed according to the agreement between the buyer and the seller. The standard sample shall be kept in hermetically closed glass vessel in a dry and dark place. The standard sample shall be replaced by fresh one once in every five years.

5.1.1 The strength of the standard sample of the dyestuff shall be assumed to be 100 percent.

6. REQUIREMENTS

6.1 Filtering Capacity Limit of Water Suspension — The filtering capacity limit of a water suspension of the dye shall be 0.6 g/100 ml minimum when measured by the method prescribed in A-2.

6.2 Chromatography Test — The height of the water suspension shall be at least 55 mm when measured by the method prescribed in A-3. However, in the phase boundary line, an insignificant zone (strip) is allowed.

6.3 Wettability in Water -The dye shall wet rapidly and spread uniformly in water at room temperature forming an intensely coloured suspension with very little turbidity. At 70°C, the suspension shall be intensely coloured without any turbidity.

6.3.1 The wettability of dye shall be tested by the method prescribed in A-4.

6.4 Time of Half-Dyeing — The time of half-dyeing of the dye on acetate and polyester fibres, when measured by the method prescribed in A-5, shall correspond to that of the standard sample of dye.

6.5 Hue of the Dye Powder — When visually examined, the dye shall appear a uniform powder of dark yellow to brown colour.

6.6 Strength and Tint of Dye -The strength of dye shall correspond to that of standard sample that is, 100 + 1 percent when tested by the method prescribed in IS :12149-1987* and IS :12150-1987†. The tint of the dye, when examined visually on dyed yarn specimens, shall correspond to that of the standard sample of dye.

*Method for determination of strength of disperse dyes on polyester by exhaust dyeing.

†Method for determination of strength disperse acetate dyes by exhaust dyeing.

NOTE — The assessment of tint may also be done instrumentally, if facilities are available.

6.7 Colour Fastness Ratings — The colour fastness ratings of the dye on acetate and polyester fibres towards various agencies shall be as given in Tables 1 and 2. The fastness of dyed fabrics made of polyester and acetate fibres to the various agencies shall be determined periodically for each lot.

7. PACKING

7.1 For smaller packing, the dyestuff in powder form shall be packed in polyethylene bags which shall be sealed and put in rustproof mild steel containers of 0.5 or 1.0 kg capacity and having an opening of 7.5 or 13.0 cm (circumference). Each container shall be made leakageproof by proper sealing of the end of corner. Each container shall be provided with a temperproof, spillproof and pilferproof sealing so as to avoid adulteration at intermediate stages. Such sealing device may consist of a mild steel ring and a plastic seal to be fitted around the neck of the container after seaming the capseal. The seal may also bear the monogram, the serial number and different columns at intervals making the replacement not very easy. A suitable number of such containers shall then be packed in wooden cases or HDPE containers lined with cushioning of corrugated paper board/synthetic cushion materials so as to mitigate shock and/or to protect surfaces from abrasion and/or to position an article in a receptacle.

7.2 The dyestuff in emulsion or paste form shall be packed in 5.0 or 10.0 kg capacity container/drum made of HDPE or polypropylene or corrugated fibre board lined with polyethylene or polyester film resins or with kraft paper combined with thermoplastic adhesives. The containers shall have an opening of 18.0 cm or 28.0 cm (circumference) for convenient scooping out of the dyestuff at the time of use. Each container shall have a temperproof, spillproof and pilferproof sealing as described for small containers.

7.3 For medium packing of dyestuff in the range of 25 to 200 kg, drums or containers as described for dyestuff in emulsion or paste form shall be used.

7.4 For bulk packing of dry 'flowable' powder of dyestuff to contain up to 2 000 kg of dyestuff, bulk bags made of HDPE or bulk boxes made from triple wall or two or more thicknesses of double wall corrugated fibre board laminated in the side walls by polyethylene or polyester film resin shall be used.

7.5 In cases of packing of dyestuff for export, in addition to the above, the packing shall be such that it meets the requirements laid in the contract

TABLE 1 COLOUR FASTNESS REQUIREMENTS OF DISPERSE YELLOW 3 ON ACETATE RAYON
(Clause 6.7)

PERCENT DEPTH OF SHADE	MINIMUM COLOUR FASTNESS RATINGS OF DYE ON ACETATE RAYON WITH RESPECT TO										
	ARTIFICIAL LIGHT	WEATHER-ING BY XENON ARC LAMP	WATER	SEA WATER	WASHING TEST 3	PERSPIRATION ACIDIC AND ALKALINE	DRY CLEANING	HOT PRESSING	RUBBING		STEAMING
									Dry	Wet	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
0·25	5-6	4-5	4 (4)	4 (4)	4 (3-4)	5 (3)	4	5 (4)	5	4-5	5 (4)
1.5	6	5	4 (3)	4 (3)	4 (3)	5 (3)	4	5 (4)	5	4-5	5 (4)
3·0	6-7	4-6	4 (3)	4 (3)	4 (3)	5 (3)	4	5 (4)	4-5	4	5 (4)
Method of Test	IS : 2454-1985 ¹	IS : 6152-1985*	IS : 767-1988 ³	IS : 690-1988 ⁷	IS : 764-1979 ⁶	IS : 971-1983 ⁸	IS : 4802-1988 ⁷	IS : 689-1988 ⁸	IS : 766-1988 ⁹		IS : 974-1984 ¹⁰

NOTE — The figures without bracket give the colour fastness ratings for change in colour while those within brackets give colour fastness ratings for staining of adjacent fabrics.

¹Methods for determination of colour fastness of textile materials to artificial light (xenon lamp) (*first revision*).

²Methods for determination of colour fastness of textile materials to weathering by xenon arc lamp (*first revision*).

*Method for determination of colour fastness of textile materials to water (*first revision*).

³Method for determination of colour fastness of textile materials to sea water (*first revision*).

⁴Method for determination of colour fastness of textile materials to washing : Test 3 (*second revision*).

⁵Method for determination of colour fastness of textile materials to perspiration (*first revision*).

⁶Method for determination of colour fastness of textile materials to dry-cleaning (*first revision*).

⁷Method for determination of colour fastness of textile materials to hot pressing (*first revision*).

⁸Method for determination of colour fastness of textile materials to rubbing (*first revision*).

¹⁰Method for determination of colour fastness of textile materials to steaming under atmospheric pressure (*second revision*).

TABLE 2 COLOUR FASTNESS REQUIREMENTS OF DISPERSE YELLOW 3 ON POLYESTER FIBRE
(Clause 6.7)

PERCENT DEPTH OF SHADE	MINIMUM COLOUR FASTNESS RATINGS OF DYE ON POLYESTER FIBRE WITH RESPECT TO																
	ARTIFI- CIAL LIGHT	WEAT- HERING BY XENON ARC LAMP	WATER	SEA WASH- WATER	WASH- ING TEST 3	PERSPI- RATION ACIDIC AND ALKA- LINE	DR Y CLEAN- ING	HOT- PRESS- ING	DECATI- ZING MILD AND SEVERE	RUBBING		MILLING		CARBO- NIZING	SUBLIMATION		
										DRY	WET	ACIDIC	ALKA- LINE		AT 150°C FOR 30 SECONDS	AT 180°C FOR 30 SECONDS	AT 210°C FOR 30 SECONDS
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
0.5	5	4.5	5 (5)	5 (5)	5 (5)	5 (4)	4	5 (4)	5	5	5	5 (5)	5 (5)	5	5 (4)	4 (3 - 4)	4 (2 - 3)
1.5	6	5.6	5 (5)	5 (5)	5 (5)	5 (4)	4	5 (4)	5	5	5	5 (5)	5 (5)	5	—	—	—
2.0	6-7	6	5 (5)	5 (5)	5 (5)	5 (4)	4	5 (4)	5	5	5	5 (5)	5 (5)	5	—	—	—
Method of Test	IS : 2454-1985 ¹	IS : 6152-1985 ²	IS : 767-1988 ³	IS : 690 - 1988 ⁴	IS : X4-1979 ⁵	JS : 971-1983 ⁶	IS : 4802-1988 ⁷	IS : 689-1988 ⁸	IS : 865-1958 ⁹	IS : 766-1988 ¹⁰		IS : 981-1988 ¹¹	IS : 983 - 1980 ¹²	IS : 11220-1984 ¹³	IS : 975-1988 ¹⁴		

NOTE — The figures without brackets give the colour fastness ratings for change in colour while those within brackets give colour fastness **ratings** for staining of adjacent fabrics.

¹Methods for determination of colour fastness of textile materials to artificial light (xenon lamp) (*first revision*).

²Methods for determination of colour fastness of textile materials to weathering by xenon arc lamp. (*first revision*).

³Methods for determination of colour fastness of textile materials to water (*first revision*).

⁴Methods for determination of colour fastness of textile materials to sea water (*first revision*).

⁵Methods for determination of colour fastness of textile materials to washing : Test 3 (*second revision*).

⁶Method for determination of colour fastness of textile materials to perspiration (*first revision*).

⁷Method for determination of colour fastness of textile materials to dry-cleaning (*first revision*).

⁸Method for determination of colour fastness of textile materials to hot pressing (*first revision*).

⁹Method for determination of colour fastness of textile materials to decatizing.

¹⁰Method for determination of colour fastness of textile materials to rubbing (*first revision*).

¹¹Method for determination of colour fastness of textile materials to acid milling (*first revision*).

¹²Method for determination of colour fastness of textile materials to alkaline milling (*first revision*).

¹³Method for determination of colour fastness of disperse dyes on polyester cellulosic fabric to carbonization.

¹⁴Method for determination of colour fastness of textile materials to sublimation (*first revision*).

and also the requirements of shipping corporations (national and international) and the insurance obligations to safeguard against unfortunate incidents. The packing shall be such that it is not damaged during transshipment, air freight or transport, and during loading and unloading.

8. MARKING

8.1 Each package shall be marked with the following:

- Name and class of the **dyestuff** according to colour index (3rd edition);
- Dye content in percentage ;
- Strength and tint of the **dyestuff** as compared to the standard dyestuff;
- Nett mass of each package;
- Trade name and/or trade-mark of the manufacturer, if any; and
- Month and year of **manufacture** and batch number.

8.1.1 Each package may also be marked with the information required by any other law in force, for example, excise regulations.

8.1.2 Each package may also be marked with the Standard Mark.

NOTE — The use of the Standard Mark is governed by the provisions of the Bureau of Indian Standards Act, 1986 and the Rules and Regulations made thereunder. The Standard Mark on products covered by an Indian Standards conveys the assurance that they have been produced to comply with the requirements of that standard under a well defined system of inspection, testing and quality control which is devised and supervised by BIS and operated by the producer. Standard marked products are also continuously checked by BIS for conformity to that standard as a further safeguard. Details of conditions under which a **licence** for the use of the Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

9. SAMPLING AND CRITERIA FOR CONFORMITY

9.1 **Lot** -All the packages of the same dye having the same dye content delivered to a buyer against one **despatch** note shall constitute a lot.

9.2 Unless otherwise agreed to between the buyer and the seller, the number of packages to be selected at random from a lot shall be as given in Table 3.

TABLE 3 SAMPLE SIZE AND CRITERIA FOR CONFORMITY

(*Clauses* 9.2, 9.3, 9.4 and 9.5)

Lot Size (PACKAGES)	SAMPLE SIZE (PACKAGES)	PERMISSIBLE NUMBER OF NON- CONFORMING PACKAGES	SUB- SAMPLE SIZE (PACKAGES)
(1)	(2)	(3)	(4)
UP to 100	10	1	5
101 to 300	15	1	6
301 to 500	25	2	7
501 to 800	35	3	8
801 to 1 300	50	4	9
1 301 and above	75	6	10

9.3 For evaluating dye content, strength tint and hue of dye, the packages selected as in col 2 of Table 3 shall constitute the test sample.

9.4 For evaluating filtering capacity limit, chromatographic pattern, wettability in water, diffusion number, time of half dyeing and colour fastness ratings, the packages selected as in col 4 of Table 3 shall constitute the test sample.

9.5 Criteria for Conformity -The lot shall be declared as conforming to the requirements of this standard if the following conditions are satisfied:

- The number of packages found non-conforming with respect to:
 - strength of dye,
 - dye content,
 - filtering capacity limit,
 - chromatographic pattern,
 - diffusion number, and
 - time of half dyeing does not exceed the corresponding- number given in col 3 of Table 3.
- The colour fastness ratings on acetate and polyester fibres shall satisfy the requirements given in Tables 1 and 2. In case of failure even in one characteristic, fresh tests will be carried out on double the samples. The results of fresh test shall be final for the entire lot.
- All the test specimens tested for the remaining characteristics, such as wettability in water, tint of dye and hue of dye shall satisfy the corresponding requirements given in this standard.

APPENDIX A

(*Clauses 3.1, 6.1, 6.2, 6.3. I and 6.4*)

METHODS OF TEST

A-1. DETERMINATION OF DYE CONTENT

A-1.1 Take a test specimen of the **dyestuff** of about one gram in a weighing bottle and dry it to constant mass in a drying oven at $105 \pm 3^\circ\text{C}$. Cool the specimen in a desiccator charged with self-indicating silica gel or calcium chloride and obtain the oven dry mass of the specimen to an accuracy of 0.000 2 g with the help of an analytical balance.

A-1.2 Dissolve the specimen in 100 ml of benzene or acetone or ethanol solution with constant stirring and filter the solution on a Buchner funnel through a **Whatman** filter paper No. 41 under low pressure of 320 mm of mercury. Repeat the procedure for the residue left twice more and collect all the filtered solution.

A-1.3 Evaporate the solvent from the solution obtained in A-1.2 and dry the residue obtained at $105 \pm 3^\circ\text{C}$ to constant mass. Cool the residue in a desiccator and weigh it.

A-1.4 Calculate the dye content, percent (P), by the formula:

$$P = \frac{m_2}{m_1} \times 100$$

where

m_1 = oven-dry mass of the specimen of **dyestuff** taken, and

m_2 = oven-dry mass of the residue obtained.

A-Z. DETERMINATION OF FILTERING CAPACITY LIMIT OF WATER SUSPENSION OF THE DYE

A-Z.1 Take **0.5** to **1.0** g samples of the dye in steps of **0.1** g and weight them correct to **0.01** g. Introduce the samples in beakers of 150 ml capacity containing some distilled water at 70°C and under stirring, add in each beaker distilled water to complete 100 ml. Place the suspension in each beaker and filter on a Buchner funnel through a **Whatman** filter paper No. 41 under low pressure of 320 mm of mercury.

A-2.2 Note the mass of that sample of dye for which the filter is uniformly **coloured** as the filtering capacity limit, however, the residues of dye may be visible in the places over the holes of the funnel when an extremely thin layer of dye may be formed.

A-3. CHROMATOGRAPHIC TEST

A-3.1 In two beakers of 50 mm dia, introduce

10 ml of 1 percent water suspension of the test dye and of the standard sample respectively. In a third beaker, take 10 ml of distilled water.

A-3.2 In each beaker, as in A-3.1, after stirring the suspension, insert a cylinder made of 70 x 80 mm rectangular chromatographic paper.

A-3.3 When, in the third beaker, water reaches the top of the paper cylinder, remove the cylinders in the other two beakers and dry them in air.

A-3.4 Compare the **chromatographs** of the test dye and that of standard sample of dye and record the height of rise of the suspension, intensity of **colouring** and appearance of strips at the bottom portion of the paper cylinder and at the level of the surface of the liquid.

A-4. DETERMINATION OF WETTABILITY IN WATER

A-4.1 Weigh about 0.05 g of test dye and the same quantity of standard sample of **dyestuff** correct to **0.01** g and add them simultaneously in separate glass cylinders containing 500 ml distilled water at the required temperature or at 25 or 70°C . By comparing with the standard sample of dye, note the solubility of test dye, rate of its spreading in water, intensity of **colouration** and the turbidity of the suspension.

A-5. DETERMINATION OF TIME OF HALFDYEING

A-5.1 Carry out dyeings of the dye on polyester and acetate fibres as prescribed in IS : 12149-1987* and IS :12150-1987†.

A-5.2 Carry out dyeings on five samples each of polyester and acetate as in A-5.1 except that the amount of dye taken shall be double to that taken in A-5.1 and times of dyeing for each sample of each fibre shall be 5, 10, 15, 20 and 25 minutes respectively.

A-5.3 Match the samples obtained in A-5.2 with those of A-5.1 separately for each **fibre** and note the time of dyeing for the sample obtained in A-5.2 separately for each fibre. Record this time as the time of half-dyeing for polyester and acetate separately.

*Method for **determination** of strength of disperse dyes for polyester by exhaust dyeing.

†Method for determination of strength of disperse acetate dyes by exhaust dyeing.

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